CHAPTER 2

Alternatives

CHAPTER 2

ALTERNATIVES

I. INTRODUCTION

This Chapter describes seven alternatives that wholly or partially meet the purpose and need identified in Chapter 1, and a no action alternative. This Chapter contains sections on:

Alternative Development Process;
Environmental Issues;
Alternatives Considered, but not Given Detailed Study;
Alternatives Considered in Detail; and
Comparison of Alternatives.

There are four alternatives considered in detail: a no action alternative and three action alternatives. Each "action" alternative represents a different combination of equipment and access methods for completing the repair work on the dam. These alternatives were designed to meet the issues identified during scoping, while at least partially meeting the purpose and need defined in Chapter 1, and represent a reasonable range of actions to accomplish those goals. This Chapter concludes with a comparison of the effects and their ability to fulfill the purpose of the proposed action. This information, along with the Chapter 4 disclosure of the projected environmental consequences of each alternative, enables the decision maker to make a reasoned choice between alternatives.

II. ALTERNATIVE DEVELOPMENT PROCESS AND PUBLIC INVOLVEMENT

Alternatives were developed based on issues, concerns, and topics identified through internal scoping and public involvement, and are designed to address and define those issues.

Public participation is an important part of this analysis, commencing with the initial scoping process (40 CFR 1501.7), which was initiated in May, 1992.

Comments from the public and other agencies have been used in defining the environmental issues and in preparation of the EIS. Public comments have also been received in conjunction with the development of the Region One Wilderness Dam Policy (6/3/92) through a series of public meetings and media announcements. A public meeting was held January 27, 1993, to solicit public comments and identify issues specific to the Bass Lake Dam Reconstruction proposal. Prior to the meeting, an information package was sent to interested groups and individuals. In addition, members of the public participated in two field trips to the dam site during the summer of 1993.

A videotape was developed and used at public meetings to display the dam site, parts of the Bass Creek Trail, and other aspects of the affected environment to groups and individuals who have not been able to visit the project site. This videotape is available for viewing at the Stevensville Ranger Station.

On May 9, 1995, before the publication of the Draft EIS, a meeting was held with interested organizations to review the issues and concerns and the preliminary alternatives.

Another field review was conducted on July 5 and 6, 1995. A representative from Wilderness Watch accompanied members of the Interdisciplinary Team to discuss plans for the trail rehabilitation and mitigation measures at the dam site.

Other public involvement and issue gathering has occurred through comments received in response to news articles and through informal contacts and meetings with individuals.

The Notice of Intent to prepare an Environmental Impact Statement was published in the Federal Register on May 27, 1993. The DEIS was mailed out to approximately 120 individuals, organizations, and other government agencies. Twenty nine comments were received.

III. ENVIRONMENTAL ISSUES

The following issues have been identified as the result of scoping:

1. Preserving Wilderness Values

How can the dam be reconstructed to safety standards while preserving and protecting wilderness values? This includes minimizing effects on wilderness resources and values; effects on the area surrounding the dam; the length of time required to complete the project (duration of the impact); access (trail) impacts; effects to recreation users; and, the feasibility of using primitive/historical tools instead of motorized equipment.

2. Watershed/Aquatic Ecosystems

What effects will the reconstruction have on the watershed and aquatic ecosystems? This includes the effects of the widening and clearing on the old road that accesses the dam; and the effects of the dam reconstruction on soil disturbance areas, creek crossings, streamflow, water quality, and fisheries in Bass Creek and Bass Lake Reservoir.

3. Equipment and Worker Access to the Reconstruction Site

What will the effects be of the equipment and workers that access the site? This includes the re-opening of the old road, the effects of heavy equipment on the old road and trail, the effects of project pack strings on the trail, and the effects of helicopter access to wilderness and wildlife resources.

4. Work Area and Base Camp at the Reconstruction Site

What will the effects be at the dam and base camp site? Here the concerns include duration of impacts, location of the camp site, camp management, the effects of livestock use, amount of workers and livestock, and staging/storage and corral areas.

5. Vegetation

How will the project affect sensitive plants and the spread of noxious weeds? This issue addresses noxious weed introduction and spread, and the protection of identified populations of sensitive species - the Few-Seeded Bladderpod and the Hairy-Leaved Spleenpoke.

6. Use of Motorized and Mechanized Equipment vs. Primitive Equipment

What are the minimum tools necessary to complete the work? This issue has to do with the feasibility of using the equipment options and should address modern and primitive equipment and transportation alternatives.

7. Dam Safety

Will all alternatives for reconstruction meet safety standards? All engineering and technical dam work must comply with standards of the National Dam Inspection Act and Federal Guidelines for Dam Safety.

8. Economics

What will the project and the alternatives cost, and how can expenses for the dam owner and the government be minimized. What will the effects of the alternatives be on the supply of irrigation water for dependent ranches?

IV. ALTERNATIVES CONSIDERED BUT NOT GIVEN DETAILED STUDY

A wide variety of alternatives were explored and considered, to meet the purpose and need for action, and to be responsive to the issues. Four alternatives were considered and eliminated from detailed study:

1. Alternative A- Primarily Primitive, Non-motorized/ Non-mechanized

This alternative was designed to meet dam safety guidelines while meeting the spirit of the Wilderness Act, using primitive tools for all possible reconstruction tasks. This alternative was suggested by several groups and individuals. This alternative was developed to address the issue of preserving wilderness values and was evaluated to determine the feasibility of completing the project without the use of mechanized and motorized equipment, in order to minimize conflicts with wilderness objectives and values.

Equipment - four teams of draft horses, fresnos, and all primitive tools (except for a 20,000 lb gas-powered winch to pull the pipe liner into the old outlet pipe, and a gas-powered compactor).

Access - All access via Bass Creek Trail, using pack stock. (except for 11-20' lengths of pipe, the winch, and the compactor, which would be flown in with a helicopter).

Duration - 3-5 operating seasons of two months each

Draft horses would be used to move and place the 2,400 cubic yards of rip rap and fill material and to widen the spillway. All crews, equipment, and supplies would access the site on horseback and pack string. This alternative would require at least four teams of draft horses plus two pack strings, 8-12 workers, (including cook, camp manager, wrangler, drivers, packers, and laborers), a large base camp, 2 corrals, and accompanying sanitation facilities. The estimated duration of the work, using a 60 day operating season (August 15 to October 15), would be three to five years.

This alternative was eliminated from detailed consideration because of the duration of the impacts, the magnitude of the camping impacts, and due to technical and safety considerations. It would require a large camp and corral area that would create an impact near Bass Creek and Bass Lake. This operation would create technical difficulties and safety risks, caused by the moving and placement of large boulders with horses and by hand. It would not be possible to meet all technical requirements of the reconstruction standards without the use of some motorized equipment. This includes the winching of the pipe liner through the existing outlet pipe, the compaction of the 165 cubic yards of fill material, and the replacement of the concrete inlet structure. These aspects of the operation require motorized equipment.

The Region One Wilderness Dams Policy (June 3, 1992) provides direction and criteria for the use of motorized/mechanized equipment for the maintenance of wilderness dams. At least two of the four criteria for the use of motorized/mechanized equipment listed in FSM 2326.1-8, Maintenance of Wilderness Dams apply to the situation at Bass Dam: #2) Where impacts to wilderness and/or resources therein would be greater using non-motorized/non-mechanical methods, including duration of impacts; and, #3) When physically infeasible to use non-motorized methods.

2. Alternative B- Reconstruct the old Bass Creek Road, No Helicopter Transport

This alternative was analyzed to address access and cost issues. It was developed to address the effects to the Bass Creek trail and adjacent resources from the reconstruction of the old road and motorized vehicle access to the dam site. This Alternative involves clearing and widening the old road to 10-12 feet, and rebuilding sections to a condition that would allow safe passage of 4-wheel drive trucks. Labor rotation, resupply, and inspection trips would be conducted with ground access.

Equipment - Caterpillar D6 tracked loader, Caterpillar 225B excavator, 5 ton dump truck, 2 pick up trucks. Other equipment as listed in the Proposed Action in Chapter 1, except for the helicopters

Access - All equipment, materials, and personnel would be transported by trucks over the reconstructed road.

Duration - 25 days, same as proposed action.

This alternative was eliminated from detailed consideration due to the amount of ground disturbance and resource effects that the reconstruction of the old road would cause within the Selway-Bitterroot Wilderness, and its incompatibility with Wilderness goals. This alternative would require an amendment to the Forest Plan, because it is possible to achieve the purpose and need for action with alternative methods that employ helicopters and more minimal tools and that would create less disturbance to the trail corridor. The General Management Direction for the Selway Bitterroot Wilderness (1992, Amendment 7 to the Bitterroot NF Land and Resource Management Plan) states on page A-1: "The minimum tool principal will be applied to the management of all resources within the Selway-Bitterroot Wilderness. This means that the minimum management actions necessary to correct a given problem will be identified. These will be implemented using the methods and equipment which accomplish the objective with the least impact on the physical, biological, and social characteristics of wilderness."

3. Alternative C- Same as the Proposed Action, but with All Helicopter Transport

This alternative was analyzed to address the access issues and the effects to the Bass Creek Trail from walking the heavy equipment to the dam and back. This alternative was evaluated to determine the feasibility of disassemblying and transporting the heavy equipment proposed for use by the dam owners to the site with a heavy-lift helicopter, avoiding the ground and vegetation disturbance to the trail and adjacent wilderness.

Equipment - Heavy-lift helicopter (Sikorsky S-64 or Boeing 234 class), Caterpillar D6 track loader and Caterpillar 225B excavator. Other equipment as listed in the Proposed Action in Chapter 1.

Access - All equipment, materials, and personnel would be flown to the site with the helicopters listed in the proposed action, with the addition of a heavy lift helicopter for transporting the loader and the excavator.

Duration - 25 days, same as proposed action.

This alternative was eliminated from detailed consideration because it is very expensive, and it would be technically difficult to reassemble the equipment at the dam site.

Alternative 3 is similar to this alternative, and it addresses the issues of the effects to the trail and old road from the heavy equipment. With Alternative 3, all construction equipment would be transported by helicopter, and lighter equipment is utilized.

4. Alternative D- Reduce the Elevation of the Spillway

This alternative was developed to reduce the amount of work needed at the dam site, which would respond to the issues of environmental effects to the wilderness, watershed and aquatic ecosystems, soil, and water resources. Lowering the elevation of the emergency spillway, and significantly reducing the amount of water impounded by the dam, would allow the dam to be in compliance with safety standards without as much additional work. The large riprap would still be needed on the dam face, and the outlet pipe liner would still need to be replaced. This alternative would require a helicopter, excavator, and a motorized winch. This alternative would meet the Federal Dam Safety guidelines, but not the Purpose and Need for Action because it would not maintain irrigation water to dependent ranchers and agricultural lands. This alternative was originally developed for a much higher probable maximum flood (PMF). Since the original PMF was calculated, new data has predicted a lower PMF, thereby not requiring the dam to be raised to provide adequate free board. This alternative would also require the purchase of water rights for water no longer available for irrigation. For these reasons, this alternative is not considered in detail.

V. ALTERNATIVES CONSIDERED IN DETAIL

This Chapter examines a range of alternatives that were developed to be responsive to the environmental issues. It includes the least environmentally harmful ways of achieving a portion of the Purpose and Need for Action.

This section provides a comparison of the effects and trade-offs of the alternatives.

Features Common to All Action Alternatives

All alternatives would meet the safety and construction requirements established by the Federal Guidelines for Dam Safety and by the Forest Service. All of the work described in the Proposed Action (Chapter 1) would be accomplished in each of the action alternatives, because these are the minimum reconstruction and repair needs, as established by law. The alternatives vary in the way and method of accomplishing the work, such as equipment, access options, and timing.

If an action alternative is approved, all work will be completed through a cooperative agreement and a Special Use Permit. This will serve as a legal contract between the dam owners and the Forest Service and will include clauses and provisions that will specify how the work is to be conducted, with mitigation measures to protect resources and values.

2. Mitigation Measures

In addition to Forest Service policy and Forest Plan requirements, the Interdisciplinary Team identified project-specific mitigation measures and other plans and specifications that would be required under any action alternative. Mitigation measures are applied to reduce or avoid adverse effects resulting from management activities.

A. Vegetation

All action alternatives will provide for the protection of the sensitive plant Bitterroot bladderpod (Lesquerella Humulis) by avoiding any ground disturbing actions in the vicinity of this population. None of the proposed alternatives includes conducting activities where Bitterroot bladderpod or other sensitive plant populations occur.

All vehicles and equipment used on the project will be thoroughly steam cleaned and inspected for the removal of potential noxious weed seeds prior to the use of the vehicles and equipment on National Forest land.

Debris burning piles will be no more than 20 feet in diameter and no more than 6 feet high, to minimize the area burned and potential habitat for noxious weeds.

Any alternative that uses Bass Creek Trail #4 (which coincides with the old road that accesses the dam) for the transport of motorized equipment will include a Trail Rehabilitation Plan (Appendix) that will specify vegetative protection and clearing needs. An objective of the plan will be to protect vegetative features and minimize negative effects from the passage of equipment. Revegetation needs for the trail will be assessed at the completion of the project. All disturbed soil areas at the reconstruction site will be seeded with a 50/50 mixture of alsike clover (Trifolium hybridum) and annual ryegrass (Lolium multiflorum) at a rate of 25 lb/acre.

B. Watershed and Soils

Any excavation needed along Bass Creek Trail #4, or along the old road where it does not coincide with the trail, will be marked on the ground for approval by the Forest Service. All stakes and survey flags will be removed upon project completion.

Best Management Practices, including Streamside Management Zone restrictions, will apply and will be implemented to mitigate effects to soil and water. These regulations are available in the project file at the Stevensville Ranger District.

Drainage dips, water bars, and intermittent stream crossing improvements will be completed along the Bass Creek Trail with Alternatives 2 and 4. These are included in the Trail Rehabilitation Plan (Appendix).

Filter cloth will be used just downstream from the outlet pipe to catch any sediment produced during work activities.

All disturbed soil areas at the reconstruction site will be seeded with a 50/50 mixture of alsike clover (Trifolium hybridum) and annual ryegrass (Lolium multiflorum) at a rate of 25 lb/acre.

C. Cultural Resources

If cultural resources not identified in initial surveys are encountered during implementation of the project, activities would be halted and the Forest Archaeologist would be notified. Activities could proceed once significance of the site has been determined and protection and mitigation of impacts are ensured. If mitigation or protection is not possible, activities may not resume.

D. Wildlife

All snags along the road that do not present a safety hazard will be protected and retained.
Helicopters will fly along the south side of Bass Creek, east of the dam, to minimize disturbance to mountain goats.

E. Recreation

To ensure public safety, sections of the Bass Creek Trail #4 will be temporarily closed to users when construction equipment is operating on the trail. Also, the trail and an area with a 1/4-mile radius around the dam site will be temporarily closed to the public during the time of the reconstruction activity. These closures will be implemented with a Forest Supervisor's order. Users will be notified of construction equipment operation times by radio announcements, newspaper articles, and trailhead notices. A wilderness ranger will monitor access and construction progress and will keep public information current.

F. Wilderness and Trails

All alternatives employ methods and equipment that are the minimum management actions which accomplish the purpose and need for action and the objectives of the alternative with the least impact on the physical, biological, and social characteristics of wilderness (minimum tool definition, Selway-Bitterroot Wilderness, General Management Direction, 1992, Appendix G-1).

A Trail Rehabilitation Plan has been developed for the use of Bass Creek Trail #4 for the transportation of motorized equipment (Appendix). The plan is based on the expected clearing and excavation, and specifies techniques and methods for: restoring and naturalizing the trail, minimizing and mitigating negative effects to visual quality and other resources, and improving drainage on the trail.

Reconstruction activity will be sensitive to needs for protecting wilderness resource values at the dam site and during ingress and egress. Disturbed areas at the dam site will be seeded, naturalized, and monitored for stabilization and vegetation needs.

An agreement for campsite management has been developed between the Forest Service and the permittee. The intent of this agreement is to provide for resource protection and the efficient reconstruction of Bass Dam. Topics addressed include: camp location, period of use, numbers of people, numbers of

stock, stock containment, wastewater disposal, garbage disposal, human waste disposal, cooking and water heating, firewood gathering, campfires, camp appearance, protection of ground cover, and food and feed storage.

The wilderness ranger will initiate contact and discussion with workers to ensure understanding and awareness of wilderness ethics and resource protection standards.

G. Air Operations, Safety, and Materials Handling

An Air Operations, Safety, and Materials Handling Plan has been prepared and will be included as part of the Special Use Permit for the reconstruction work. It specifies communication needs, landing zones, safety hazards, fuel transport, transfer, and storage, other material storage requirements and sites, and helicopter use restrictions. A contingency plan and response agreement for spill emergencies has been developed between the Reservoir Company and Land and Water Consulting Inc., of Missoula, Montana.

3. Monitoring Common to All Action Alternatives

Monitoring is designed to:

- Determine if assumptions made for effects analysis were correct
- Determine if resource objectives are being achieved and verify implementation
- Assess the degree of particular effects

The length of monitoring activities is determined by the results and evaluation of what is being monitored. When there is no longer any question that regulations or standards are being met, monitoring of that particular element will cease. If, on the other hand, monitoring evaluations reveal that regulations or standards are not being achieved at the desired level, some type of intervention will occur. This is referred to as the monitoring "feedback loop" whereby action is taken based on monitoring evaluation to obtain appropriate and timely solutions to resource problems. A new level of monitoring may occur following the action to ensure that the desired results are obtained.

A Forest Service wilderness ranger and a trails specialist will be assigned the responsibility of monitoring the implementation of the reconstruction project and ensuring wilderness and resource protection standards are met at the dam site and within the access corridor. The wilderness ranger and trails specialist will use the specifications in the permits, agreements, and all plans and mitigations measures to ensure the access and reconstruction is meeting the mitigation and protection standards.

A Forest Service civil engineer will be assigned the responsibility for monitoring and ensuring the legal engineering and technical standards are met during all construction stages.

Follow-up inspections of the dam and trail will provide monitoring of the effectiveness of the repair work, for safety and engineering standards,

wilderness and recreation objectives, and trail rehabilitation and drainage improvements. These will be completed at least annually and will also monitor the revegetation success on disturbed sites and noxious weed spread.

4. Alternative Descriptions

A. Alternative 1-No Action

This alternative is required by the National Environmental Protection Act (NEPA) and will serve as a baseline condition to compare other alternatives with. This alternative would not meet the Purpose and Need for Action, because the dam would not be improved to a condition that would meet the safety standards required by the Forest Service for the operation of reservoir.

The dam would remain in non-compliance with the federal dam safety laws. Normal and routine maintenance could be approved under the authorization of the existing special use permit. This could include the replacement of the outlet pipe and the log boom.

B. Alternative 2-Proposed Action

This alternative was proposed by the owners of the dam. It is designed to be cost efficient and to minimize the time spent on the reconstruction. It is designed to complete all reconstruction work in one operating season. It is responsive to the issues of dam safety and social/economic effects. With the incorporation of the mitigation measures listed above, it is responsive to the issues related to protecting wilderness and other resource values.

The excavator used in this alternative has the horsepower and capacity necessary for completing the cofferdam installation and excavation necessary for the replacement of the twin inlet pipes and the concrete casing as described in part 1.A. of the Proposed Action, Chapter 1, page 2.

1. Equipment Required for Alternative 2

- Caterpillar D6D tracked loader- 40,000 lbs, 9'4" wide, 15'10"long.
For the excavation and placement of rip-rap and fill.

- Caterpillar 225B excavator/backhoe. 60,000 lbs, 10'6" wide, 32'3" long.
For the excavation and sorting of the rip-rap; and at the inlet area, for the excavation and shaping of the fill material, for the widening of the spillway, and for the insertion of the transmission pipe.

- John Deere 4-wheel drive farm tractor, 5800 lbs, 6'7" wide.
To pull the PE pipe welder, mounted on a trailer, (4600 lbs, 6'0" wide).

- Bell 204 helicopter (or similar)
To transport all other equipment and supplies (including the sections of pipe, and diesel fuel in 250 gallon containers)

- Hughes 500 helicopter(or similar)
To transport personnel and smaller supplies.

Other motorized equipment proposed: compactor device, rock drill, chain saw, generator(s), welder, grout pump.

2. Access to Site

Bass Creek Trail #4, which utilizes the road that was constructed in 1952 to access the dam site would be used to walk in the tracked loader, the excavator, and the farm tractor and back to the trailhead upon completion of the project. The trail, which coincides with the road for 6.0 miles, is 7.4 miles in total length. The old road would need to be rebuilt along a 200 foot section that has been filled in by a rock slide. The road crosses Bass Creek in two locations, and low water fords are present for walking equipment across the creek. Clearing would be needed along the remainder of the route. This would include moving some rocks and removing small trees that have grown up in the road. In some places vegetation could be driven over. Vegetation that is severely damaged would be removed. The excavator requires approximately a 10'6" wide cleared area for travel; the loader and tractor require less width. Clearing and excavation would be limited to that amount that is needed for safe passage of the equipment. On the way out the excavator would come last and would be used to rehabilitate and naturalize the road by narrowing the tread, replacing rocks and vegetation, and scattering broken limbs and stems.

All other access to the site, including the transportation of all workers, equipment, fuel, and supplies, would be done with the two helicopters. Helicopter flights would be minimized and kept within specified corridors to mitigate wilderness and wildlife impacts.

3. Camp and Storage Area

A camp for the six person reconstruction crew would be located west of the dam, and on the north side of Bass Lake. The previously excavated area south of the dam would be used as a helicopter landing area and for storing and staging equipment and supplies. A staging and heliport area would be located on private land near mouth of the Bass Creek canyon. A camp management plan, and a plan for air operations, safety, materials handling, and storage is part of this and all action alternatives.

4. Duration

Work would begin around September 1, or possibly earlier, depending on the water level in the reservoir. The project would take an estimated 3-4 weeks. The camp at the dam site would be occupied by a maximum of six persons for approximately 25 days while work is underway. The pipe repair should take 3-4 days; the rock and fill work may take 10 days; the log boom, 2-3 days, and the remainder of the time will be used for camp set-up and break-down, equipment preparation, maintenance, and work site preparation. Bad weather may increase this timeframe.

C. Alternative 3-Emphasize Primitive Tools and Fly in Lighter Construction Equipment

This alternative was designed to use more primitive tools in completing the necessary repair work; to avoid the impacts caused by walking the excavation

necessary to meet the dam safety requirements and laws. This alternative was developed to address the issues related to preserving wilderness values, protecting the Bass Creek Trail from the effects of construction equipment, protecting watershed, aquatic ecosystems, sensitive plants, and using a minimal amount of motorized and mechanized equipment in the wilderness.

This alternative would use an 18,000 pound Spyder excavator instead of the larger excavator in Alternative 2. This alternative would also employ a 5 cubic yard dump truck that would weigh 15,000 pounds, or 2 Bobcat loaders that would weigh 8,800 pounds each, instead of the the track loader in Alternative 2. An analysis has determined that the required work at the dam could be completed with this lighter equipment, although it would take a longer period of time, and would cost more than the permittees proposal. This equipment would be dismantled into 2-4 sections each. A heavy lift helicopter would be required to transport the individual sections, and they would be reassembled at the dam site.

The construction equipment in this alternative does not have the power or capacity to complete the cofferdam installation and excavation necessary for the replacement of the twin inlet pipes and the concrete inlet structure, as described in Part 1.A. of the Proposed Action, Chapter 1. A concrete maintenance program that is completed every 3-5 years to patch and seal the old concrete, is a required part of this alternative. The concrete maintenance will require the use of motorized pumps and the installation of a smaller cofferdam, to pump dry the concrete area to be maintained. This will also require the use of a helicopter to transport the pumps and cofferdam materials. With continued maintenance, after 20-25 years, the inlet pipes and concrete casing will need to be replaced, requiring the larger excavator.

The medium and the light helicopter, as described in Alternative 2 would also be used to transport equipment and supplies that weigh more than 75-100 pounds and that are not transportable by packstock; as well as for emergency needs. All other materials and supplies would be brought in with packstock. Crews would ride in for their 6-10 day shift and ride out again. Food and supplies for the camp would also be transported by packstock.

Other aspects of the work would be completed with hand tools if practical, such as the chain saw work, which would be completed with a cross-cut saw, the replacement of the log boom, and possibly the rock drilling. Four to six workers would camp at the site for 6-8 weeks.

1. Equipment Required for Alternative 3

- Spyder Excavator- 18,000 lbs, 7'9" wide, 14 feet long
For the excavation and sorting of the rip-rap; for the excavation, placement, and shaping of the fill material; for the widening of the spillway; and for the insertion of the transmission pipe.

- 5 cubic yard dump truck, 8'0" wide, 16 feet long, 15,000 lbs, or 2 Bobcat 953 loaders, 8,800 lbs each, 5'6" wide, 12'0" long.
For carrying the excavated material to the placement locations, and for excavation and placement work.

- Sikorski S-61 or Boeing 107 heavy-lift helicopter (or similar)
For transporting the sections of the Spyder excavator, dump truck, or Bobcat loaders, and the pipe fusion machine.

- Bell 204 helicopter (or similar)
To transport larger and heavier equipment that is not transportable by packstock.

- Hughes 500 helicopter(or similar)
To transport larger and heavier equipment that is not transportable by packstock.

Other motorized equipment proposed: compactor device, rock drill, chainsaw, generator(s), welder, grout pump.

2. Access to Site

All practical supplies would by transported by packstock, along the Bass Creek trail. Workers would also walk in or ride horses. Pack stock can carry about 150-200 lbs per trip, in packages of 75-100 lbs. Some sections of the Bass Creek Trail would need to be improved to safely handle the amount of pack stock use, to prevent tread damage and to protect the trail from erosion. Other larger and heavier items would be transported with the helicopters.

3. Camp and Storage Area

A camp for the 4-6 person reconstruction crew would be located west of the dam and on the north side of Bass Lake. The area south of the dam would be used as a helicopter landing area and for storing and staging equipment and supplies. Packstock would not remain at the dam site overnight. Trips would be planned to allow packstock to walk back to the trailhead the same day. Horses would be rested and unloaded at the storage area and watered near the camp. A staging and heliport area would also be located on private land near mouth of the Bass Creek canyon.

4. Duration

The duration of the project with this alternative would be approximately 50 days. Work would begin around September 1, or possibly earlier, depending on the water level in the reservoir. Inclement weather may increase this timeframe. This alternative requires the maintenance of the concrete inlet structure at 3-5 year intervals and the replacement of the structure in 20-25 years.

D. Alternative 4- Walk in Lighter Construction Equipment

This alternative was designed to protect wilderness values, minimize effects to the Bass Creek Trail, and to be less costly than Alternative 3. This alternative was designed to be closer in total cost to Alternative 2 and to be shorter in duration than Alternative 3. Duration would be approximately 35 days.

This alternative would use the same construction equipment as described in Alternative 3, but the Spyder excavator and the 5 yard dump truck (or 2 Bobcat loaders) would be walked up the old road. The excavator would pull or winch the other equipment behind it, except in places where the other equipment could maneuver under their own power. The John Deere farm tractor and trailer, as described in Alternative 2, would be used to transport the pipe fusion machine. The excavator would proceed slowly ahead of the other equipment to move rocks and clear downed logs to provide a cleared corridor. The clearing would be the minimum amount needed to allow the equipment to safely proceed. The Spyder excavator "walks" with four hydraulic legs, and it would take an estimated five days for the equipment to reach the construction site at this pace.

Like Alternative 3, the lighter construction equipment in this alternative does not have the power or capacity to complete the cofferdam installation and excavation necessary for the replacement of the twin inlet pipes and the concrete inlet structure, as described in part 1.A. of the Proposed Action, Chapter 1. A concrete maintenance program that is completed every 3-5 years to patch and seal the old concrete is a required part of this alternative. The concrete maintenance will require the use of motorized pumps and the installation of a smaller cofferdam to pump dry the concrete area to be maintained. This will also require the use of a helicopter to transport the pumps and cofferdam materials. With continued maintenance, after 20-25 years, the inlet pipes and concrete casing will need to be replaced, requiring the larger excavator.

The trail would need to be improved along the 200 foot section that has sloughed in, although not to the degree as in Alternative 2, because the equipment is smaller and narrower. The Spyder excavator is 7'9" wide, the 5 yard dump truck is 8' wide, and the Bobcat loaders are 5'6" wide. The wheeled equipment or the excavator would be equipped with a winch to assist the wheeled equipment up or down the steep sections.

This alternative would not require the use of the heavy lift helicopter, but the light and medium helicopters would still be used to transport equipment and supplies. Packstock would not be relied upon for the delivery of lighter equipment and supplies. Helicopter use would be minimized to eliminate unnecessary flights.

1. Equipment

- Spyder Excavator- 18,000 lbs, 7'9" wide, 14 feet long
For the excavation and sorting of the rip-rap; for the excavation, placement, and shaping of the fill material; for the widening of the spillway; and for the insertion of the transmission pipe.

- 5 cubic yard dump truck- 8'0" wide, 16 feet long, 15,000 lbs, or 2 Bobcat 953 loaders, 8,800 lbs each, 5'6" wide, 12'0" long.
For carrying the excavated material to the placement locations and for excavation and placement work.

- John Deere 4-wheel drive farm tractor- 5,800 lbs, 6'7" wide.
To pull the PE pipe welder, mounted on a trailer, 4,600 lbs, 6'0" wide.

- Bell 204 helicopter (or similar)
To transport all other equipment and supplies

- Hughes 500 helicopter (or similar)
To transport personnel and smaller supplies.

Other motorized equipment proposed: compactor device, rock drill chainsaw, generator(s), welder, grout pump.

2. Access to Site

The excavator, the dump truck (or the 2 Bobcat loaders), and the farm tractor with trailer would be walked in and out along the old road. All other equipment would be flown in, using the light and medium sized helicopters. The old road would be minimally cleared and would be rehabilitated and naturalized as the excavator walks out.

3. Camp and Storage Area

The camp and storage area would be the same as described for Alternative 3, except there would not be packstock loading or unloading in the area. A camp for the 4-6 person reconstruction crew would be located west of the dam and on the north side of Bass Lake. This area south of the dam would be used as a helicopter landing area and for storing and staging equipment and supplies. A staging and heliport area would be located on private land near mouth of the Bass Creek canyon.

4. Duration

The duration of the project with this alternative would be approximately 35 days. Work would begin around September 1, or possibly earlier, depending on the water level in the reservoir. Inclement weather may increase this timeframe. This alternative requires the maintenance of the concrete inlet structure at 3-5 year intervals and the replacement of the structure in 20-25 years.

VI. COMPARISON OF ALTERNATIVES

The comparison of the alternatives is done by using issues or concerns that were identified during the public scoping and by using those identified by the Forest Service. This provides a clear basis for choice among the alternatives by the decisionmaker and the public. Some issues have been consolidated to facilitate a better understanding of relational effects.

1. Wilderness and Recreation

TABLE 2.1 - COMPARISON OF ALTERNATIVES - WILDERNESS AND RECREATION

ISSUES	ALTERNATIVES 1 No Action	2 Proposed Action	3 Fly Lighter Equipment	4 Walk Lighter Equipment
Preserving/Protecting Wilderness Values in Assessment Area	*	-3	-1	-2
Estimated Duration of Effects to Wilderness (days)	*	25	50	35
Effects to Bass Creek Trail # 4- Within and Outside of Wilderness	*	-3	-1	-2
Effects on Wilderness Recreationists	*	-3	-1	-2
Use of Minimum Tools	*	yes	yes	yes
Use of Primitive Tools		no	yes	no
Future Disturbances to Trail and Wilderness	*	no	yes	yes

* No probable effect in the short term. However, if the dam should fail because of lack of repairs, it would create major negative effects to wilderness values and to the Bass Creek Trail.

-1 Possible negative effect-relatively low
-2 Possible negative effect-relatively moderate
-3 Possible negative effect-relatively high

Discussion of these possible effects is in Chapter 4.

2. Visual Quality

Alternative 1

The existing visual situation would remain unchanged under this alternative. Objectives that are currently being met at the trailhead and along the trail would continue to do so as would those objectives at the dam site and along the trail that are currently not met.

Alternative 2

In addition to the negative visual impacts from the staging area, camp, and equipment at the dam site, this alternative would introduce the greatest reductions in visual quality along the length of the trail/road for several seasons, until the disturbed vegetation had time to become re-established.

Trail users would also sustain impacts from the helicopter flights and machinery intrusions, although the duration of the reconstruction period is the shortest of all the action alternatives, and there are no further future visual disturbances.

Alternative 3

With this alternative, recreationists would view more helicopter flights overhead, but it eliminates the visual effects associated with driving construction equipment on the trail. There may be less visual intrusions at the dam site with the use of more primitive tools, but the overall duration of the construction period is twice as long as Alternative 2. This alternative requires future entries for maintenance and repair needs, which would cause visual effects and disturbances.

Alternative 4

This alternative would have similar effects at the dam site as Alternatives 2 and 3. It would require some trail/road clearing and soil displacement to accommodate the smaller equipment on the trail, but the effects to visual quality along the trail would be less than Alternative 2, because of the smaller equipment. Negative visual consequences from these alterations would be less than Alternative 2; but like Alternative 2, trailside areas of disturbed soil and vegetation would not meet the preservation visual quality objective for several years. This alternative requires future entries for maintenance and repair needs, which would cause visual effects and disturbances.

3. Watershed and Aquatic Ecosystems

All of the action alternatives would introduce minor sedimentation of the lower Bass Lake in the immediate vicinity of the dam and in Bass Creek at the reservoir outlet; as well as for several hundred yards immediately downstream. Favorable conditions of streamflow to maintain beneficial water uses instream and downstream would be provided by all alternatives. The alternatives vary primarily in their sedimentation potential resulting from the different means of equipment access to the dam.

Small increases in sediment yield to Bass Creek would occur with all action alternatives as a result of repairing the dam, installing the pipe liner, widening the spillway, and/or clearing and using the Bass Creek Trail with excavation machinery. There would be small differences in the degree of sediment input caused by the various alternatives. These differences would be too small to be quantified. Sediment inputs from the dam repair work would be minor, temporary, and largely confined to the upper mile of Bass Creek directly below the dam where suitable year-round fish habitat is not available and fish are only present in late summer when small numbers (<40 fish) of westslope cutthroat trout are washed out of Bass Lake through the open dam headgates. Alternatives 2 and 4 could potentially cause higher sediment yields; however, it is unlikely that increases in sediment yield produced by heavy machinery use of the trail would adversely affect populations of fish and aquatic organisms in Bass Creek. Heavy machinery use of the trail in Alternatives 2 and 4 could

potentially cause sediment inputs on a slightly larger scale, with Alternative 2 producing slightly more sediment than Alternative 4 because of the size of the equipment and degree of ground disturbance. These sediment inputs, however, would be short-term, localized, and not of a large enough magnitude to cause detectable changes in habitat quality or channel equilibrium.

Alternatives 3 and 4 require additional future access for the large excavator, for the replacement of the concrete inlet structure. This would create minor sediment introduction as the excavator crosses the Bass Creek fords and around the inlet pipes, as described in Alternative 2 for the immediate entry.

With all alternatives, dam reconstruction and trail access will not disturb any wetlands.

4. **Fisheries**

Alternative 1

This alternative would have no effect on populations of fish and aquatic organisms in the Bass Creek drainage. Alternative 1, however, does not reduce the risk of future dam failure and catastrophic flood, and does not reduce rust deposition immediately below the dam outlet from the existing transmission pipe and inlet Y-structure. In the event of sudden dam failure, entire populations of fish and aquatic organisms could be lost. A small, isolated bull trout population in the lower half of the drainage faces a high risk of extinction from catastrophic flood events.

Alternative 2

Slightly higher sediment yields produced by Alternative 2 could potentially impact individual fish or habitats in the immediate downstream vicinity of the heavy equipment crossing points, but would not be of a large enough magnitude to adversely affect bull trout and westslope cutthroat trout populations. Sediment input from heavy equipment crossings would have no measurable impact on fish population viability, size, or overall reproductive success. Aquatic invertebrate production and stream habitat quality immediately below the dam outlet would be improved by replacement of the existing inlet Y-structure.

Alternative 3

Alternative 3 would produce the smallest and most restricted initial input of sediment of all the Action Alternatives. Sediment produced by this Alternative would be restricted to stream reaches immediately downstream of the dam outlet; however, some minor sediment input would occur every 3-5 years as a result of the concrete maintenance program and again in 20-25 years with the use of the larger excavator to replace the concrete inlet structure. Overall, sedimentation would not be of a large enough magnitude to affect bull trout and westslope cutthroat trout populations in Bass Creek. Aquatic invertebrate production immediately below the dam outlet would be lower than normal as a result of the chronic rust deposition produced by the existing inlet Y-structure.

Alternative 4

Sediment yields are predicted to be intermediate when compared to those of Alternative 2 (heavy machinery crossing) and Alternative 3 (no crossing). Lighter equipment would still have to be driven across Bass Creek in two locations; however, crossing with lighter vehicles would cause less substrate disruption and produce slightly less sediment input than Alternative 2. Minor sediment input to upper Bass Creek as a result of the concrete maintenance program and future larger excavator access would be similar to that of Alternative 3. Sedimentation would not be of a large enough magnitude to adversely affect bull trout and westslope cutthroat trout populations in Bass Creek. Aquatic invertebrate production immediately below the dam outlet would be lower than normal as a result of the chronic rust deposition produced by the existing inlet Y-structure.

5. Vegetation and Sensitive Plants

All action alternatives involve setting up a camp at the dam for durations ranging from 3-8 weeks. The sites selected for camping and storage are on previously disturbed areas, used for camping or dam construction in the past. A camp management plan and low impact camping techniques will be used to minimize damage to vegetation on these sites. Work will be done on the dam after September 1st, when most of the vegetation will have become dormant, which will also help minimize impacts on vegetation.
Bitterroot bladderpod (Lesquerella humilus) is the only sensitive species known to occur in or near the project area. None of the proposed alternatives includes conducting activities where Bitterroot bladderpod or other sensitive plant populations occur.

Alternative 1

There would be no adverse effects on the trailside vegetation or vegetation on the old roadbed as a result of the no action alternative. Vegetation on the old roadbed on the south side of the creek will continue to grow in and take over the site.

Alternative 2

The effects of walking 10.5 foot wide equipment up the Bass Creek Trail will damage vegetation and will most likely kill some vegetation alongside the existing trail. After the activity, it will revegetate after several years, as it has since last used in the 1960's. Along the section of old road on the south side of the creek, which is not used as part of the trail, most of the vegetation can be walked over with the equipment. The alder should grow back within another 10 years and the dead wood left on site will be a deterrent to hikers and horseback riders, as well as helping to prevent soil erosion.

Alternative 3

This alternative would present less effects to the vegetation along the trail because construction equipment would not be driven over the trail or the old road. Impacts on the trail will be moderately increased over normal by the

heavier stock use, but pack animals would not be left on the site for any length of time. Future vegetation disturbance on the trail and at the dam site would occur in 20-25 years with the large excavator access and work to replace the concrete inlet structure. This would be similar to the effects described in Alternative 2.

Alternative 4

The effects of proposed activities in Alternative 4 will be similar to Alternative 2 since the road will be used to walk some equipment up to the dam. However, the equipment being walked up will be smaller in width so the trail will not have to be widened any more than 8 feet. Like Alternative 3, future vegetation disturbance on the trail and at the dam site would occur in 20-25 years with the large excavator access and work to replace the concrete inlet structure. This would be similar to the effects decribed in Alternative 2.

6. Wildlife- Management Indicator, Threatened, Endangered, and Sensitive Species

Alternative 1

This alternative will not alter the habitat or change the existing level of human disturbance to any wildlife species in the area. There will be no effects to any wildlife species from implementation of this alternative. A failure of the dam, however, would have major effects.

Alternative 2

This alternative would result in minor, short-term habitat alterations along the Bass Creek Trail due to widening the trail to allow passage of heavy equipment. Operating heavy equipment on the trail could also disturb animals living near the trail which are not accustomed to motorized equipment. This alternative has the potential for minor impacts to pine marten, boreal and flammulated owls, and fisher along the trail. It also has some potential for short-term impacts to mountain goats due to disturbance from helicopter flights up and down the drainage. None of the effects pose threats to individuals or populations.

Alternative 3

This alternative would have no effect on wildlife species along the Bass Creek Trail, because there would be no habitat alteration along the trail to allow for the passage of heavy equipment. In addition, there would be no disturbance from motorized equipment on the trail. The potential for disturbance to mountain goats would be somewhat higher than in Alternative 2, because a larger helicopter would be required to transport equipment. Future disturbance to wildlife habitat along the trail would occur in 20-25 years with the large excavator access and work to replace the concrete inlet structure. This would be similar to the effects along the trail corridor described in Alternative 2.

Alternative 4

Effects of this alternative to wildlife species along the trail and near the lake would be similar to those described for Alternative 2. Like Alternative 3, future disturbance to wildlife habitat along the trail would occur in 20-25 years with the large excavator access and work to replace the concrete inlet structure. This would be similar to the effects along the trail corridor described in Alternative 2.

7. Cultural Resources

All Alternatives

No historic sites were discovered during the 1993 inventory for the proposed alternatives or during previous archaeological surveys. No activities are planned within one mile of the two documented sites located outside the project impact area of the Bass Lake Dam Reconstruction site. Based on knowledge of the patterns of prehistoric and historic land use in the area, the area's topography and environment, and the results of cultural resource inventories in the area, there is low likelihood for impact on significant cultural resources in the area of potential effect.

8. Economics

TABLE 2.2 - TOTAL COSTS BY ALTERNATIVE

ALTERNATIVE 1 - NO ACTION

This alternative would have no immediate costs; however, increased maintenance costs will be a result of not correcting dam deficiencies. Also, if the dam were to catastrophically fail as a result of not making the needed repairs, there could be major costs and liabilities due to loss of property, resources, and human lives.

ALTERNATIVE 2 - PROPOSED ACTION

Mobilization	$10,000
Helicopter	12,500
Camp	200
Pipe	31,000
Trash rack	1,800
Spillway widening	2,500
Rip-rap/filling	16,100
Log boom	2,300
Inlet	18,400
Misc. site work	2,700
Cleanup	3,000
Demobilization	14,000
Superintendent	5,000
Contingency	12,000
Trail rehab	8,000
TOTAL	$139,500

ALTERNATIVE 3 - FLY IN LIGHTER EQUIPMENT

Mobilization	$39,600	
Helicopter	17,520	
Camp	200	
Pipe	31,000	
Trash rack	1,800	
Spillway widening	2,500	
Rip-rap/filling	17,750	
Log boom	2,300	
Misc. site work	2,700	
Cleanup	2,750	
Demobilization	29,700	
Superintendent	7,360	
Contingency	15,500	
TOTAL	$170,680	
Inlet maintenance	10,000	Estimated at $2,000 every 4 years for 20 years
Inlet replacement	20,000	Needed in 25 years
Trail rehab	5,000	Needed in 25 years
TOTAL	$205,680	Includes estimated future costs

The additional helicopter costs for Alternative 3 are included in the mobilization and demobilization categories.

ALTERNATIVE 4 - WALK IN LIGHTER EQUIPMENT

Mobilization	$29,800	
Helicopter	17,520	
Camp	200	
Pipe	31,000	
Trash rack	1,800	
Spillway widening	2,500	
Rip-rap/filling	17,750	
Log boom	2,300	
Misc. site work	2,700	
Cleanup	2,750	
Demobilization	18,400	
Superintendent	7,360	
Contingency	13,450	
Trail rehab	5,600	
TOTAL	$153,130	
Inlet maintenance	10,000	Estimated at $2,000 every 4 years for 20 years
Inlet replacement	20,000	Needed in 25 years
Trail Rehab	5,000	Needed in 25 years
TOTAL	$188,130	Includes estimated future costs